

An aerial photograph of a road intersection. Several cars are visible, including a white car in the top left, a dark car in the center, and a white van in the middle right. Blue concentric circles and lines radiate from the cars, representing sensor waves or autonomous driving technology. The background is a dark blue gradient.

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THE SECRET STARTUP TAKING DRIVERLESS CARS MAINSTREAM

LUKE LANGO

Self-driving is quickly going from science fiction concept to disruptive reality thanks this small technology company...

Nearly 100 years ago, a Czech physician and novelist by the name of Miles J. Breuer predicted the future.

In his 1930 science fiction book *Paradise and Iron*, Breuer “invented” the concept of **autonomous vehicles**, offering up this idea of a mysterious paradise island where all the cars, trucks, and boats drove themselves.

Over the next few decades, autonomous vehicles became commonplace... in science fiction.

You may remember KITT, the self-driving car in the 1980s TV series *Knight Rider*. Or the Johnny Cab in *Total Recall*. Even the Batmobile could maneuver itself at just the press of a button.

This fantasy of autonomous vehicles has captivated humankind's imagination for decades. An almost romantic notion of high-tech society, largely confined to the borders of movies, books, and comics.

Until now...

Over the past decade, relentless innovation and multiple technological breakthroughs have set the stage for the exciting science fiction concept of self-driving cars to finally become **a disruptive reality**.

Semi-autonomous cars are already on the roads, conducting test drives in various cities throughout the world, including Phoenix, Detroit, Boston, Berlin, London, and many, many more.

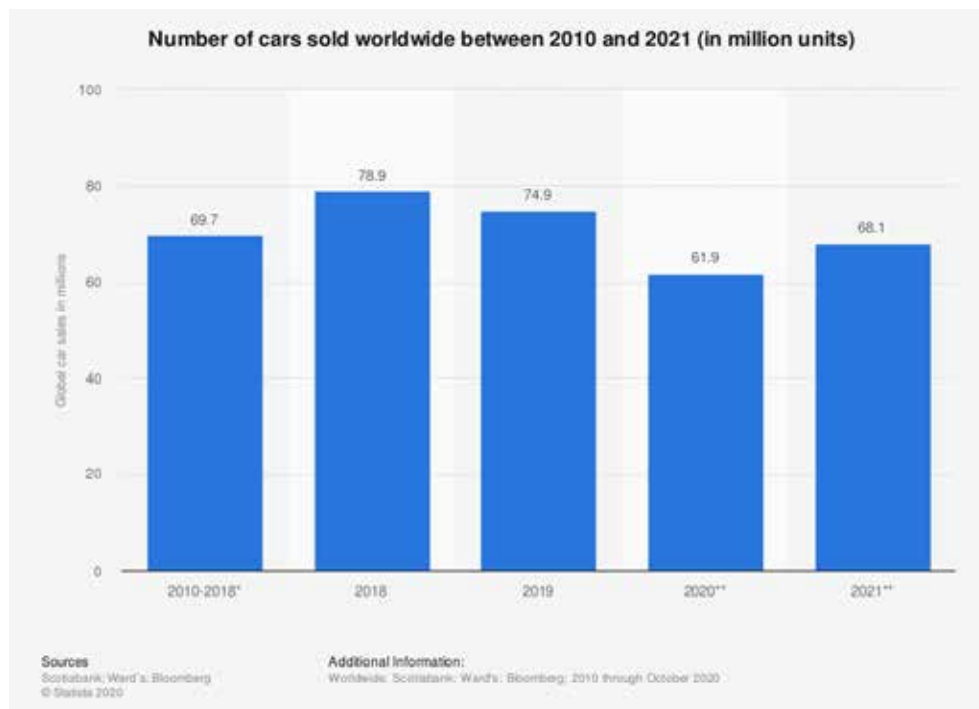
Fully autonomous cars are not too far behind. Indeed, in China, fully autonomous vehicles without any driver in the car are already being tested on roads.

These tests are just the beginning... the “tipping point” of the **Self-Driving Revolution**, if you will.

It's only a matter of time before these semi-autonomous and fully autonomous cars go into production mode and end up in the garages of consumers all across the globe.

At this very moment, we're experiencing the tremors from this seismic shift toward autonomous vehicles, which, like the science fiction worlds radical enough to birth self-driving vehicles, will have life-changing economic implications.

But, for reference, here are the numbers:



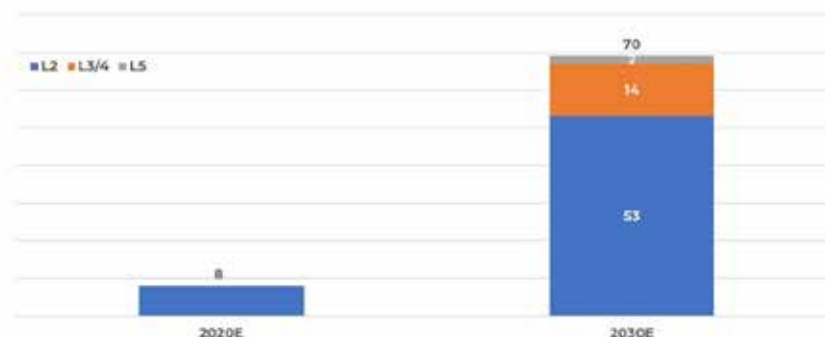
Worldwide, about 70 million new passenger cars are sold every year. In 2020, only 8 million of those cars sold will have some level of low autonomy.

By 2030, **all 70 million are expected to include some form of autonomy**, with many projecting to have high autonomy.

This is a disruption like no other.

The entire multi-trillion-dollar auto market is on the cusp of being uprooted by AV technology.

Global New Vehicle Market (Units in M)



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And it's all thanks to one core technology — **LiDAR**.

The key to unlocking full autonomy is to enable cars to have complete “vision” — or, more specifically, to give them a human-like ability to see and respond to their surroundings.

Ideally, you want to do this with built-in cameras, since cameras are space and cost efficient.

But computer vision (which is what you get from cameras) has significant limitations which have proven difficult to overcome. It's now commonplace across the AV space to equip cars with laser-light perception sensors called LiDAR.

The science and engineering behind LiDAR are complex. But, at a high level, the idea is pretty digestible.

LiDAR sensors “beam” out lasers to their surroundings. Those laser beams hit objects around the car, and then bounce back to the sensors. The sensors then either carefully measure the travel time of those laser pulses (called time-of-flight, ToF), or a change in frequency of the returning light wave (called Frequency Modulated Continuous Wave, FMCW), to create a proxy for distance.

Do this thousands of times in a 360-degree frame-of-view, and voila... you have a **complete** and **dynamic** “picture” of the surrounding environment.

Sounds pretty neat, right?

It is.

More than that, **it is revolutionary** – revolutionary enough to create the building blocks upon which Breuer's utopian concept of self-driving-everything becomes a reality.

To be sure, some say that CV technology will make significant enough advancements over the next few years to make LiDAR sensors antiquated. Elon Musk is one of those people, and history shows that the **Tesla (TSLA)** CEO is often right.

But... most other industry experts agree that LiDAR will forever have a place as the foundational technology of self-driving.

They argue — and correctly so — that CV is still a long way from being very good. And even when it is very good, it will never be perfect, meaning there will always be a place for LiDAR to “fill in the gaps.”

To that end, LiDAR sensors will forever remain the foundational technology upon which the cars of the future will be built.

Let's put some numbers to that.

Each of the 70 million cars sold annually will eventually become self-driving, meaning all 70 million will eventually be outfitted with LiDAR sensors. Normally, there are about 2 sensors per car. Most companies are aiming to reduce all-in LiDAR costs to \$1,000 per sensor.

Considering this, the LiDAR market at scale projects as a \$140 BILLION industry.

It is merely a \$1 billion market today.

Yes. You read that right. The self-driving revolution will unlock a **140X growth opportunity** in the global LiDAR market.

This unprecedented transition is creating a once-in-a-lifetime investment opportunity... and one secret startup founded by a boy whiz -- who many call the "next Elon Musk" — is at the epicenter.

The World's Best LiDAR Company Is Ready for Breakneck Growth

You don't drop out of Stanford unless you have a serious backup plan.

When he dropped out of Stanford at 17 in 2012, **Austin Russell** had a seriously good reason.

Russell had just won a \$100,000 seed investment from famed venture capitalist **Peter Thiel**. Peter found financial fame as Facebook's first major investor, and now he was after Russell's self-driving startup aimed at making next-generation LiDAR sensors.

Russell's startup has since morphed into the self-driving industry's most powerful force.

That startup is known as **Luminar Technologies (LAZR)**. Just last year, it emerged from hiding and made a splashy debut in the public markets.

Make no mistake. Buying Luminar stock today could be the smartest thing you ever do.

Luminar is the best independent LiDAR company in the world.

The company has leveraged multiple technological breakthrough innovations to develop the industry's best LiDAR sensors – and it's not even close.

Luminar's sensors feature max resolution of 300 PD (pixels/degree) and 250-meter range. All other independent LiDAR sensors in the world have a max resolution of less than 100 PD, and a range of less than 150 meters.

To put it bluntly: ***Luminar has built the industry's only viable long-range LiDAR.***

To that end, Luminar's LiDAR is also the only sensor in market that broadly meets ALL automobile manufacturer system requirements for perception tech, including:

- 1. Long range** – 250 meter range
- 2. High resolution** – 300 PD resolution
- 3. Weather resilience** – >200 meter range in rain and snow
- 4. Zero interference** – zero sunlight/LiDAR interference

On top of all that, Luminar has purpose-built a proprietary perception software to unlock the full potential of its hardware sensors and create a full, end-to-end autonomy stack that gives automobile OEMs an all-in-one AV solution.

It should be no surprise, then, that Luminar has leveraged its best-in-breed technology to score tons of auto-industry partnerships.

7 of the top 10 passenger car OEMs have partnered with Luminar, while most major programs in trucking and robo-taxi have done the same.

Altogether, Luminar has **50 commercial partnerships** which represent **75% of the global passenger vehicle, trucking, and robo-taxi ecosystem.**

Many of these partnerships are in advance stages.

Two of them – one with **Volvo** and another with an unnamed customer – are in the series production phase. Indeed, Volvo projects to start producing semi-autonomous passenger cars with built-in Luminar LiDAR in 2022.

So begins Luminar's march toward a \$75 BILLION valuation.

Current estimates peg semi-autonomous and fully autonomous vehicle sales at 70 million by 2030, representing near 100% penetration in those markets.

Luminar's order book with Volvo implies that the company will nab ~1% of this market by 2025. Management is targeting 4% penetration by 2030. I think, given the company's tech advantages, 5% market share is more likely.

That implies about 3.5 million Luminar LiDAR-integrated cars in 2030. At ~2 sensors per car, that equates to ~7 million sensors. Luminar's financials imply average unit revenue of ~\$1,000 per sensor, for total revenue by 2030 of \$7 billion.

This is a capital-light, high-margin business, with management targeting 50%-plus EBITDA margins by 2030. That implies \$3.5-plus billion in EBITDA, which my numbers suggest could flow into \$3 billion in net profits.

Auto parts suppliers typically fetch a 15X earnings multiple. But Luminar also has a software component, and those companies typically fetch a 35X multiple. A 50/50 mix there implies a fair exit multiple for Luminar of 25X.

A 25X multiple on \$3 billion in net profits implies a **potential future market cap for Luminar of \$75 billion...**

It's just a \$10 billion company today.

That's enough upside that Luminar stock may turn into the market's biggest single winner in the 2020s... and it is certainly enough upside to consider taking a position in Luminar stock today.

Best regards,

A handwritten signature in black ink, appearing to read 'Luke Lango', with a stylized, flowing script.

Luke Lango
Editor, *Innovation Investor*